

REMARKS

This is in response to the Office Action of August 25, 2003. In that Office Action, claims 3-5 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctively claim the subject matter which the applicant regards as the invention.

Claims 1-4 were rejected under 35 U.S.C. §102(b) as being anticipated by EPO 760 401 (EP '401).

Claim 1 was also rejected under 35 U.S.C. §102(b) as being anticipated by the following references:

SU 1801987 (SU '987), JP 01255675 (JP '675), JP 61238979 (JP '979) and JP 60121275 (JP '275).

Claims 3-5 were rejected under 35 U.S.C. §102(b) as being anticipated by JP '275.

Claims 4-5 were rejected under 35 U.S.C. §103 as being unpatentable (for obviousness) over the above-referenced JP '275 and EP '401 in view of JP 015237449 (JP '449).

By this Amendment, claims 1, 3 and 5 have been amended. As amended, claim 1 is directed to a method of passivating galvanic zinc-nickel coatings characterized in that the coating is treated with an oxidizing agent and the zinc-nickel coat is oxidized at a pH of 1.8.

Claim 3, as amended, is directed to the method of claim 1 characterized in that the conversion coat is applied the passivated zinc-nickel coat.

Claim 5, as amended, is directed to the method of claim 1 characterized in that a coat of a dry lubricant is applied to the passivated zinc-nickel coat.

Turning first to the prior art, EP '401 discloses a method for depositing a corrosion resistant protective coat on a metal or metal alloy surface. Zinc-nickel alloys are mentioned in EP '401. The film is formed on the surface by immersing the metal substrate in an aqueous solution comprising an oxidative substance, silicate and/or silicon dioxide and specific metal ions such as Ti, Zr, Ce, Sr, V, W or Mo.

EP '401 teaches depositing a separate passivation film on the metal substrate. The method described in EP '401 is thus a known method wherein chromate films are deposited on a metal substrate. (Similar methods are also described in JP '449 and JP '275).

The disadvantages of these methods are known and are described in the specification of the present application. For example, chromium(VI) is carcinogenic and should be avoided. The known alternative, which is based on chromium(III), has inadequate corrosion protection properties. Furthermore, the deposition of a separate protective film that is composed of

different components has the disadvantage that the composition of the solution must be constantly controlled in order to ensure the correct formation of the electrolyte and, thus, the quality of the deposited coats.

The other references, SU '987, JP '675, JP '979 and JP '275 refer to processes wherein the metal alloy is colored, more particularly, blackened. The application refers to known black passivation methods for zinc-nickel coatings. As described in the present application, such methods have the disadvantage that the material from the zinc-nickel alloy is removed during the passivation. This increases the cost, since material removal during passivation must be taken into account when depositing the zinc-nickel alloy. JP '675 also refers to this problem during passivation. Specifically, JP '675 states that the thickness of the layer is usually excessively reduced during blackening. JP '675 suggests adding an organic inhibitor in order to overcome this problem. Organic compounds have the disadvantage, however, that they burden the electroplating waste water.

Furthermore, there is room for improvement in the known passivation methods with regard to the adhesion properties, to ensure that the subsequent coat strongly adheres to the passivation film.

In contrast to the above, the method of the present invention provides a method for passivating zinc-nickel coatings which does not raise any health concerns or create additional burdens associated with disposal. This results in a cost savings.

Applicant has surprisingly found that a very effective passivation for zinc-nickel coats can be achieved at low cost by treating the zinc-nickel coated work piece with an oxidizing agent at a pH of 1.8, as recited in amended claim 1. A particular advantage of this invention is that it is not necessary to deposit a separate coat (such as a chromate coat) in order to achieve good passivation. In accordance with the present invention, it is sufficient to oxidize the coat at a pH of 1.8. This quick and simple procedure results in that part of the zinc-nickel layer is converted into a voluminous nickel passivation layer during oxidation. This layer not only includes good passivation properties, but because of its voluminous surface, has excellent adhesion properties for subsequent coatings. The effect of this is that the coats applied to the passivation film adhere directly and very effectively to the passivated surface. Applicant submits that this is a major improvement and advantage over known methods.

In accordance with the present invention, it is also possible to abandon metal ions such as chromium ions. Moreover,

the present invention overcomes the need to continuously monitor the composition of the electrolyte. In addition, it should be kept in mind that the metal ion used in prior art techniques to generate the protective coat are quite expensive compared to the method according to the present invention.

The voluminous nickel passivation coating is only generated when the zinc-nickel coat is oxidized at a pH of 1.8. The above described results are not achieved at other pH values.

Accordingly, it is important that the pH value of 1.8 be maintained during passivation. The passivation film made from the method of the present invention provides good adhesion qualities for subsequent coatings such as organic films and the like that further improve corrosion resistance and allow variations and color.

The method of the present invention and the advantages that flow therefrom are not described in any of the references relied upon by the Patent Office. For example, EP '401 discloses a very broad range of pH values (0.5 to 6, preferably 1.5 to 3; see page 3, lines 15 and 16). Of course, it should be noted that the method of EP '401 provides for the formation of a protecting coat on any kind of metal substrate. Different metal substrates have different demands with respect to pH values.

Notably, EP '401 does not disclose oxidizing zinc-nickel coatings at a pH of 1.8. As shown in Table 1, EP '401 does disclose a pH 1.8, but not for zinc-nickel coatings.

As shown in Table 1, EP '401 does disclose a pH of 1.8, but not for zinc-nickel alloys (as in the present invention) but for pure zinc coatings. With respect to zinc-nickel coatings, the pH values disclosed are 2.5 or 4.0 (see Table 3, No. 16 and table 1, No. 7). Therefore, the pH values disclosed in EP '401 for a zinc-nickel coating are well outside the preferred pH value of the present method as claimed in amended claim 1. For these reasons, amended claim 1 is not anticipated by EP '401.

SU '987 also does not disclose a zinc-nickel coating oxidized at a pH value of 1.8. For this reason alone, claim 1, as amended, is not anticipated by SU '987.

JP '675 discloses a method for blackening a zinc-nickel coating wherein an oxidant is used. JP '675 discloses a pH value below 3. However, Table 1 of JP '675 shows a pH value of 1 in examples 16 and 17. A pH value of 1 is far removed from the claimed pH value of 1.8. Example No. 7 discloses a pH value of 2.0. However, a pH value of 2.0 would not work. For this reason, claim 1 as amended is also not anticipated by JP '675.

JP '979 also discloses a method for coloring a steel plate which is subjected to a zinc alloy coating. JP '979 does not, however, contain any guidelines regarding the pH value that

could be used in order to passivate the zinc-nickel coating.

Simply stated, JP '979 does not mention a pH value of 1.8. For this reason, claim 1 as amended is not anticipated by JP '979.

JP '275 discloses a method for blackening a zinc-nickel surface. Like the previous reference, it does not disclose a pH value of 1.8 nor does it suggest that such a value would provide for a passivated zinc-nickel coating with the excellent characteristics described above. For this reason, claim 1 as amended, is also not anticipated by JP '275.

JP '449 discloses a method for covering a metal or metal alloy plated steel plate with a chromium coating with a lubricating resin. JP '449 only teaches depositing a regular chromate film. It does not contain any disclosure or suggestion using any specific pH value when oxidizing a zinc-nickel coating.

Applicants also submit that none of the art either taken alone or in combination would have rendered claim 1, as amended, obvious. Specifically, none of the cited references disclose or even suggest that adjustment of the pH value during oxidation of the zinc-nickel coat would improve the quality of the passivation film or could result in a passivation film with excellent passivation and adhesion properties. Applicants submit that there would have been no incentive for one of the

ordinary skill in the art to vary the pH values based on the art of record.

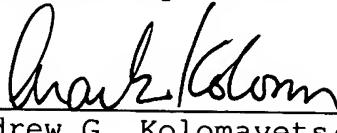
In fact, based on the pH values that are disclosed (e.g., pH 1, See JP '675 and pH 4 in EP '401), one of ordinary skill in the art would have come to the conclusion that the pH value is not critical for blackening or passivating the zinc-nickel coating. He would not be inclined or motivated to vary this parameter since he would not appreciate that a specific pH value would have an effect on the quality of the passivation. It is more likely, that one of ordinary skill would attempt to improve the coat by adding new compounds such as organic compounds, or chromate or phosphate films as was done in the art such as JP '675, EP '401 and JP '275.

Furthermore, there is no suggestion in the art of record that a pH value of 1.8 must be adjusted and maintained during oxidation in order to generate a passivation method having the described advantageous characteristics. The pH values that were known in the art are not close to the claimed pH value. Thus, the invention as recited in the amended claims, would not have been obvious in view of this art.

For the reasons set forth above, Applicants respectfully submit that the claims are now in condition for allowance.

Reconsideration and allowance of such claims are respectfully  
requested.

Respectfully submitted,

  
Andrew G. Kolomayets  
Registration No. 33,723

COOK, ALEX, MCFARRON, MANZO,  
CUMMINGS & MEHLER, LTD.  
200 West Adams Street - #2850  
Chicago, IL 60606  
(312) 236-8500